Probing Nanoscale Polymer Interactions by Forced-Assembly

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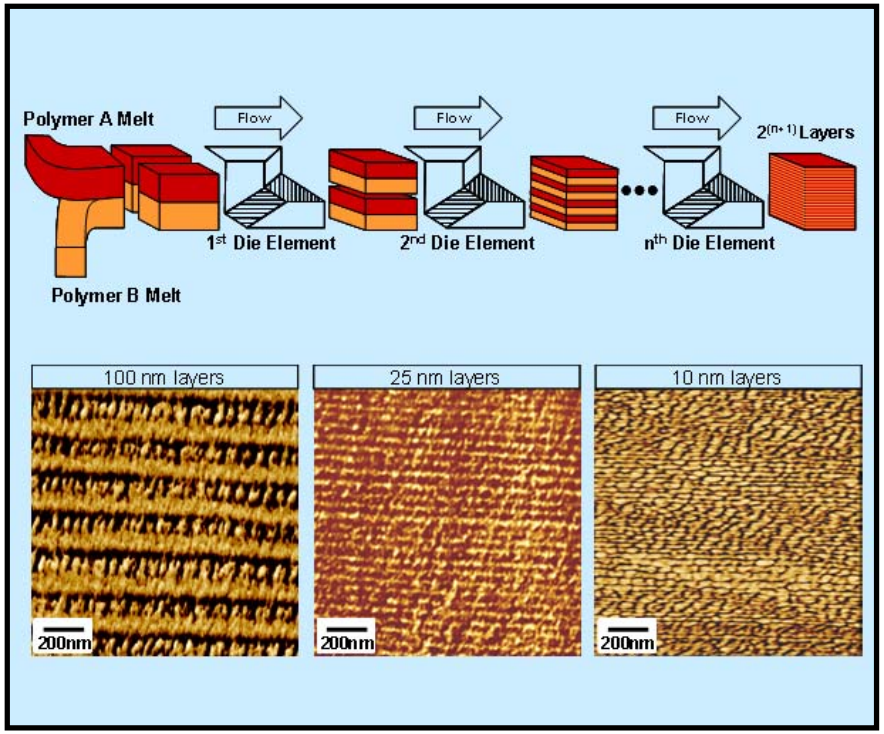
Nanolayer processing facilitates the creation of new hierarchical polymeric systems. In contrast to the well-known concept of self-assembly, layer multiplying coextrusion uses forced-assembly to create thousands of alternating layers of two polymers. Each layer can be less than 10 nm in thickness. This dimension is on the size scale of the "interphase" that forms by localized mixing when two immiscible polymers are brought into intimate contact. Materials that are entirely "interphase" are created. Analysis of the "interphase" materials by conventional methods of polymer analysis confirms certain theoretical predictions for the first time.



Schematic of layer-multiplying coextrusion that uses forced-assembly to create films with thousands of alternating nanolayers of two polymers (top) and the nanoscale structures revealed by atomic force microscopy (bottom).

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